EAP Task Force

EUWI
EU WATER INITIATIVE

JOINT MEETING OF

THE EAP TASK FORCE'S GROUP OF SENIOR OFFICIALS ON THE REFORMS OF THE WATER SUPPLY AND SANITATION SECTOR IN EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA

THE EU WATER INITIATIVE'S EECCA WORKING GROUP

FINANCING STRATEGIES ON RURAL WATER SUPPLY AND SANITATION IN ARMENIA

MILLENNIUM DEVELOPMENT GOALS AND MINIMAL WATER SUPPLY STANDARDS

DRAFT NOTE

DOCUMENT 20

PARIS 2007

Institute for Applied Environmental Economics

FINANCING STRATEGIES ON RURAL WATER SUPPLY AND SANITATION IN ARMENIA

Millennium Development Goals and
Minimal Water Supply Standards

Draft Note

A project for the State Committee for Water Systems in Armenia, managed by the EAP task force, and with financial support of European Union under the EU Water Initiative

Disclaimer: Opinions presented in this document are those of the Consultant and do not necessarily represent the opinion of the Steering Committee of the project, nor of the Armenian Government

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16 May 2007

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 Aim of this note

This document aims at informing the National Policy Dialogue on Financing Rural WSS.

It discusses possible Armenia-specific interpretations of the Millennium Development Goals (MDGs) for rural Water Supply and Sanitation (WSS), integrating the MDGs with so called "*minimal water supply standard*" which is under discussion, and might be eventually introduced in Armenia.

Respectively, the document starts with discussion of the "*minimal water supply"* concept suggesting different options of how the "*minimal water supply standard*" could be defined in case of rural WSS, and providing (mostly qualitative) assessment of the options.

It is expected that based on this paper the SCWS (State Committee for Water Systems) and the members of the Steering Group of the project will agree upon a certain (preferable) interpretation(s) of certain components of the "*minimal water supply standard*" (MWSS) which might be introduced in Armenia, as well as on interpretation(s) of MDGs on WSS, acceptable in the Armenian context and based on the "*minimal water supply standards*". This Armenia-specific interpretation(s) of MDGs on WSS will then be simulated by the Consultant using FEASIBLE model to check its financial feasibility.

The final objective is to agree upon a financially feasible scenario to meet MDGs on WSS, develop and agree upon a policy package for rural water supply and sanitation in Armenia and the elements thereof.

The ultimate objective of this document is to help the SG making choices for the policy package.

Chapter 2 suggests and assesses different options of how the MDGs for Armenia can be interpreted and how the "*minimal water supply standard*" could be defined in case of rural WSS. By comparing the MDGs with MWSS, the way in which these two approaches can be integrated in one policy package is discussed.

Chapter 3 provides guidance on how the general targets developed in chapter 2 can be translated in more concrete scenarios that can be simulated with Feasible[1]. Also legal and institutional considerations are given, with some proposals to show how institutional choices affect the feasibility of the FS for rural WSS.

[1]

2 MILLENNIUM DEVELOPMENT GOALS AND MINIMAL WATER SUPPLY

2.1 Introduction

A policy package for rural water supply and sanitation (WSS) can be implemented in various ways. But also the general targets for a policy package can be set in a number of ways.

In this chapter, two approaches will be discussed, including the relationship between these:

- Approaches based on the "Millennium Development Goals" (MDG's);
- An approach based on the concept of "Minimal Water Supply Standards" (MWSS), and how it might be integrated with MDGs.

More specifically, this section first gives the internationally-agreed definitions of MDGs on WSS and how this would apply to rural WSS in Armenia, the MDGs on rural water supply as defined in the Poverty Reduction Strategy Paper, followed by a discussion on "*minimal water supply standards"* (MWSS) concept, suggesting different options of how the "*minimal water supply standard*" could be defined in case of rural WSS, and providing (mostly qualitative) assessment of the options. Finally, options how these two concepts can be integrated, are discussed.
In discussing and integrating these approaches for rural water supply, we will mainly concentrate on:

- **Quantity** – minimal volume of water supplied, in litres per capita per day (lcd)). Should this be 20 lcd as suggested by MDGs definitions, or rather be 50 or even 100 lcd?
- **Distance** – distance to the water source, availability of in-house or yard tap, or water delivered from distant sources by tanker-tracks. Should the maximal distance be 1000 meter (which may take a roundtrip of 1 hour walking), or rather be 100 meter (as suggested by the draft law on drinking water) or be on plot (as suggested by the WHO guidelines)?
- **Service quality** – pressure, duration of water supply/water supply schedule. What should be the minimal ambition level?
- **Drinking water quality** – chemical and biological contamination, taste, colour, odour, etc. How can quality be improved by chlorination of drinking water in pied systems.

2.2 Millennium Development Goals for water supply and sanitation

2.2.1 Definitions

Millennium Development Goals, or MDGs, adopted by the general assembly of the UN of 8 September 2000, aim at reducing poverty and equality. MDGs are formulated for 8 goals (e.g. poverty, education, child care, health, etc.), amongst others environmental sustainability (goal 7), and more specifically for water supply and sanitation (target 10, indicators 30 ad 31). Goals and targets are time bound and refer to 1990 as a base year[2] and 2015 (in general) as the target year.

The official targets of the UN are presented in table 2.1

[2] Although the official MDG target 10, does not mention a base year specifically, so assumingly reference may also be made to another year than 1990 for target 10 (maybe because lack of applicable statistics is anticipated for 1990?)

Table 2.1
Millennium Development Goals, Targets for Water Supply and Sanitation

Goals and Targets (from the Millennium Declaration)	Indicators for monitoring progress
Goal 7: Ensure environmental sustainability	
Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	30. Proportion of population with sustainable access to an improved water source, urban and rural 31. Proportion of population with access to improved sanitation, urban and rural

Source: UN, 2007, official Millennium Development Goals website (www.un.org/millenniumgoals/)

To understand these definitions well, one needs to understand what means "sustainable access" to "an improved water source" and "improved sanitation". According to the according to UN definition the following should be understood:

- **Water Supply**: "Improved" technologies include: house connection, public standpipe, borehole, protected dug well, protected spring, rainwater collection. "Not improved" technologies are: unprotected well, unprotected spring, vendor-provided water, bottled water (based on concerns about the quantity of supplied water, not concerns over the water quality) and tanker truck-provided water. It is assumed that if the user has access to an "improved source" then such a source should be likely to provide 20 litres per capita per day at a distance of no longer than 1000 metres; and
- **Sanitation**: "Improved" technologies include: connection to a public sewer, connection to septic system, pour-flush latrine, simple pit latrine, ventilated improved pit latrine. The excreta disposal system is considered adequate if it is private or shared (but not public) and if it separates human excreta from human contact in a hygienic manner. "Not improved" are: service or bucket latrines (where excreta are manually removed), public latrines, latrines with an open pit.

2.2.2 MDGs for WSS in Armenia, official UN definition

If the definition of the UN is followed, for Armenia it *may* imply, that rural water supply services by "improved" technologies, should be increased from roughly 74%[3] (the sum of the rural "improved water supply": in dwelling, in building and public taps, see figure 2.1) to 87% by 2015.

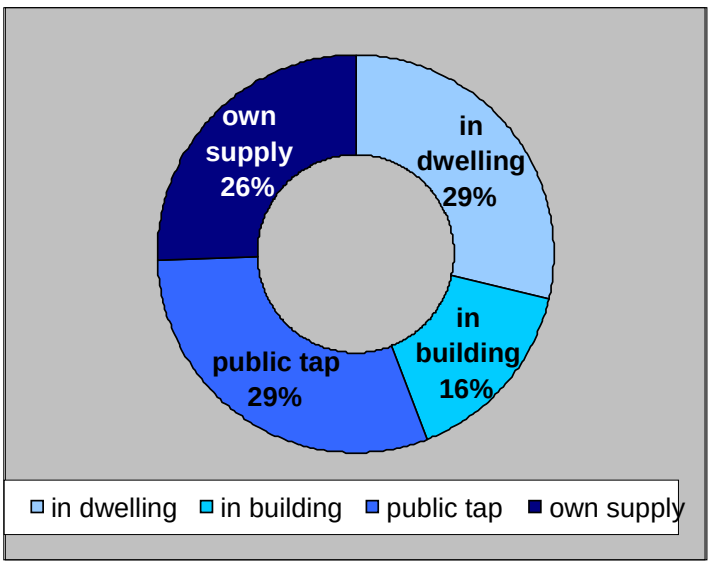


Figure 2.1
Rural water supply in Armenia, 2001, by type of connection

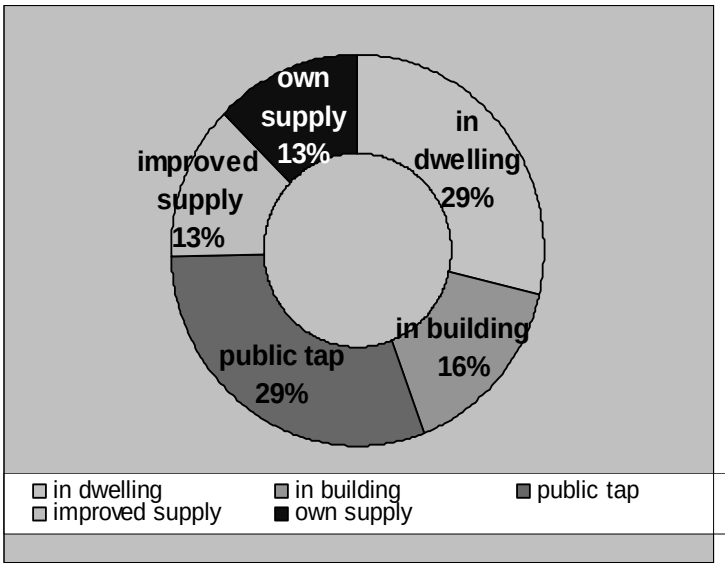
Source: Armstat, 2001

[3] Figures for 1990 are not available, the earliest figures relate to 1995. In 1995 73% of rural population had access to drinking water supply, with a daily supply of 117 lcd. After 1995, access increases to 75%, but supply reduces to 34 lcd. (ARMSTAT, `Housing conditions of population", Statistical Yearbook Armenia, 2001)

The assumption is that all rural inhabitants with an in dwelling/building tap already meet the MDG but also the stand-posts, as according to old Soviet regulation access to a public tap should not be longer than 200 meter. Water quantities available to rural inhabitants are at a low 34 lcd in 1998 and more or less stable afterwards (43 lcd in 2004) (Armstat, 2006). Concerning drinking water quality, there are however, indications that this is not true everywhere,

This would mean, that at least part of the rural population, currently served by "own supply" would have to shift to supply from a "protected" water source, assuming that currently "own supply" is "not protected"[4]

Figure 2.2
Rural water supply in Armenia, according to theoretic MDGs, 2015, by type of connection



In most cases this will be a stand-post, yard tap or an in house tap. In some cases it may be an own water source, but this then requires, that water quality in the source should comply with certain standards and be inspected.

However, it is not possible to even assess at this moment the exact situation in relation to rural "improved water supply". In many cases drinking water is not treated (e.g. chlorination). The results of the JICA questionnaire show that about half of rural water supply is not treated, maybe indicating lack of chemical and biological quality.

For sanitation the situation is less clear, as no reliable statistics exist on the sanitation situation in rural areas. According to the statistical yearbook only 3% of rural population had access to sewerage in 2004 (ARMSTAT, 2005), for the rest of the rural population the situation is unclear. In the report on the baseline, the following suggestion was made (see table 2.2)

Table 2.2
Types of toilets in rural Armenia (2000), and assumed type of sanitation, proportion of population with access to a certain type of sanitation infrastructure and service

Type of toilet	Share of population	Type of sanitation			
		Simple pit latrine	Improved pit latrine	Septic tank	Sewerage
Non flush toilet	79%	60%	10%	9%	-
Flush toilet	21%			11%	10%

Source: census (data on type of toilet) and own assessment

If this is near the reality, all rural inhabitants already would have improved sanitation.

[4] Probably true, if "protected" implies regular checks of quality.

So although there are some indications on how the WSS targets of the MDGs can be translated to the Armenian situation, it is not possible to exactly specify the base situation, which makes it impossible to exactly define the target.

For reason of simplicity (and illustration)[5], it is proposed to the SC to interpret the MDG for water supply in Armenia as:

- **Water Supply:** increasing the "improved water supply" (either stand-post, or on plot supply or boreholes, or protected wells/springs etc.) from about 74% to 87% (to be achieved by 2015).
- For **Sanitation:** the situation is too unclear and data incomplete to make a robust interpretation of the MDG. Nevertheless, based on available fragmental data accomplished by expert "guestimates" the following approach can be proposed:
  - reduce simple pit latrines owned by households to about 30% of rural population by 2015
  - increase improved pit latrines and septic tanks to about 70% of rural population by 2015 (in connection with the type of water supply: if on plot water supply with at least 80 lcd exists then at least a septic tank should be installed)

2.2.3 MDG for WSS in Armenia according the Poverty Reduction Strategy Paper

Next to the (theoretical) approach based on the official definition of the MDG for WSS in the section above, in the Poverty Reduction Strategy Paper (**PRSP**), another target is mentioned for rural water supply. It states:

"the access to safe supply in rural settlements" should increase from 45% of the population in 2001 to 70% by 2012 (and 2015) (page 35, PRSP).

In the PRSP, another definition of MDG is used, than the UN definition of the water supply MDGs discussed above. It assumes on plot supply[6] by a centralised (piped) system. In addition the PRSP states that by 2015 the supply should be **24** hours.

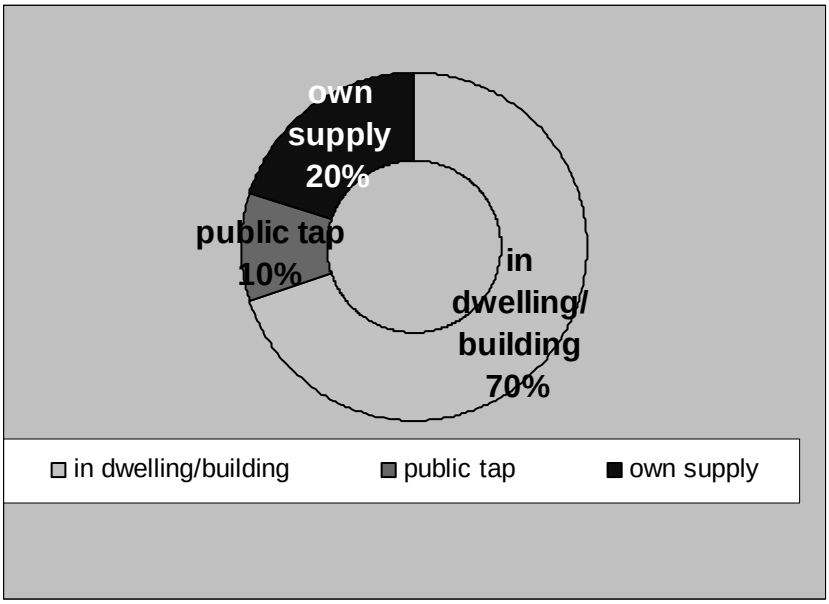


Figure 2.3 Indication of rural water supply in Armenia, according to PRSP, 2015, by type of connection

[5] there is also a very practical reason for this proposal: Feasible does not include an seperate cost function for chlorination alone, chlorination is costed as part of fully-fledged (and costly) water treatment,

[6] PRSP states in point 368 "A centralized water supply is available to 71% of households, including 87% in urban, and 45% in rural areas". This coincides with on plot supply in figure 2.1.

For some reason the PRSP refers to the situation in 2001 as a reference year rather than 1990. This is probably done for a practical reason, as most EECCA countries lack data for 1990[7]

Figure 2.3 gives an indication of the changes needed, to achieve the targets. It would mean that in house and on plot supply would increase from 45% to 70% (in the figure there is made no distinction between the two types of supply). It is also assumed that part of own supply will be replaced by public taps (standpost).

For reason of simplicity, it is proposed to the SC to interpret the MDG for WSS as laid down in the PRSP in Armenia as:

- **Water Supply:** increasing the "on plot" (either in house or etc.) from about 45% in 2001 to 70% in 2015.
- For sanitation the PRSP does not mention a target

2.3 Minimal Water Supply Standards

The State Committee for Water Systems of Armenia, has asked for assistance on developing a concept of "Minimal Water Supply Standards (MWSS)" (SCWS, 2006).

There is no such thing as an internationally accepted definition of minimal water supply standards. The most near to this concept are the guidelines for water supply of the WHO (WHO, 2006), which will be discussed hereafter.

From the document provided by the SCWS to the EAP Task Force and TME, it can be understood, that the ideas of the Armenian government go in the direction of setting certain standards, which should be complied with everywhere in Armenia.

2.3.1 Key elements of the Minimal Water Supply Standards

The "*minimal water supply standard"* which might be eventually introduced in Armenia would have the following key elements (see SCWS's "Proposal on provision of rural communities with minimal water supply service"):

1. Water quantity – volume, in litres per capita per day;
2. Distance – distance to the water source, availability of in-house or yard tap, or water delivered from distant sources by tanker-tracks;
3. (Tap) water quality – chemical and biological contamination, taste, colour, odour, etc.
4. Service quality – pressure, duration of water supply/ water supply schedule

Moreover, MWSS could also be interpreted as a right of the consumer to water supply of at least a minimal standard.

In the following sections these elements of MWSS will be discussed. Before doing so, the WHO guidelines on drinking water supply will be discussed in the next section, as these give general, and internationally accepted guidance for drinking water supply.

2.3.2 WHO guidelines for water supply

In the WHO guidelines, a 4 tier classification system of drinking water supply is used (WHO, 2004, p. 91). Basic parameters in these guidelines are:

- distance to the water supply, or time needed to collect water;
- amount of water that can be collected.

[7] lack of statistical data for the reference year 1990, and the practical assessment that during 10 years the situation probably has not improved (rather worsened), or because the official MDGs for WSS not explicitly refer to 1990 as base year)

This results in an overall assessment of the public health risk from poor hygiene and potentially needed policy interventions and actions.

Table 2.3 gives an overview of this 4 tier system.

Table 2.3
Service level and quantity of water collected

Service level	Distance/time	Likely volumes of water collected	Public health risk from poor hygiene	Intervention priority and actions
No access	More than 1 km / more than 30 min round-trip	Very low - 5 litres per capita per day	**Very high** Hygiene practice compromised . Basic consumption may be compromised.	**Very high** Provision of basic level of service Hygiene education
Basic access	Within 1 km / within 30 min round-trip	Average approximately 20 litres per capita per day	**High** Hygiene may be compromised Laundry may occur off-plot	**High** Hygiene education Provision of improved level of service
Intermediate access	Water provided on plot through at least one tap (yard tap)	Average approximately 50 litres per capita per day	**Low** Hygiene may not be compromised Laundry may occur on-plot	**Low** Hygiene promotion still yields health gains Encourage optimal access
Optimal access	Supply of water through multiple taps within the house	Average 100 - 200 litres per capita per day	**Very Low** Hygiene may not be compromised Laundry may occur on-plot	**Very low** Hygiene promotion still yields health gains

Source: Howard & Bartram (2003), referred to in WHO (2006)

The table shows, that only the service levels, classified as “Intermediate access” and “Optimal access” are regarded as having a (very) low risk from poor hygiene. This can be classified as “Safe water supply” according to the WHO.

The two other service levels: “No access” and “Basic access” establish a (very) high risk for public health, thus being classified as “None safe water supply”.

However, there is certainly a grey area between “basic assess” (20 lcd/max. 1 km), and “Intermediate (on plot) access” (50 lcd/on plot). For example, a standpipe within 100 – 200 meter, would not require much time spending (5 – 15 minutes) to collect water, and can supply high quality water.

2.3.3 Water quantity

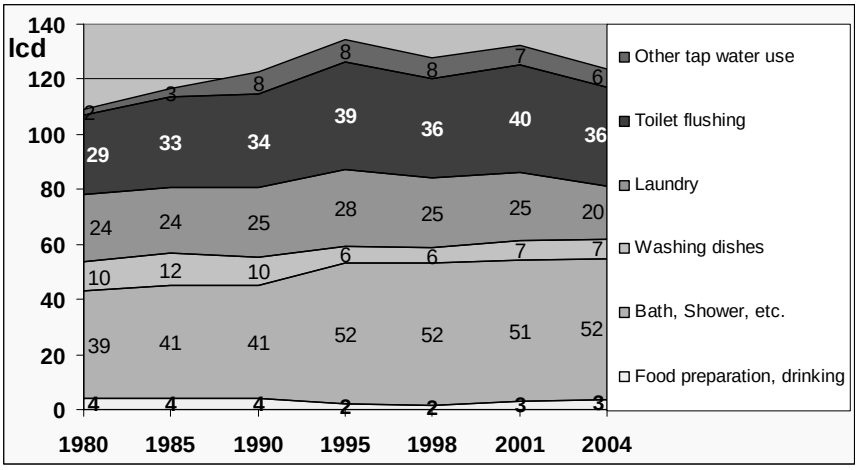
Guidance on what minimal water supply means in terms of **quantity** (measured in lcd) can be obtained from looking at standards or practices in other countries, as well as at relevant recommendations of the World Health Organisation (50 lcd, see previous paragraph).

Practical experience shows that domestic water use varies to a large extend, giving little guidance on minimal quantities:

- in Canada, the domestic water use was 638 litres per person per day in 1999 (NRCan);
- in rural settlements in China domestic water use (in 1993) varies from less than 50 lcd (examples: Anhui, Shaanxi, Gansu) to over 110 lcd (Beijing, Shanghai, Xizang), in many regions between 50-90 lcd (Sichuan, Yunnan, etc.) (FAO, 2007);
- In Brazil, in a rural settlement in Minas Gerais, the average water use of households with an individual water source is on average 25 lcd, households that have to collect water from a distance, only use as little 9 lcd (Fundação Oswaldo Cruz, 2007).

Analysing the domestic water consumption pattern can give more guidance on identifying minimal water supply. An example of water supply practice in Holland is given in figure 2.4.

Figure 2.4 Domestic water use per capita per day in the Netherlands



Source: MNP, 2005

This graph shows the development of water supply in the Netherlands during the period 1980 – 2004.

One can see that the per capita use of drinking water varies between 105 litres per capita per day (lcd) to almost 140 lcd in 1995. After 1995 a slight decrease in water use can be observed, due to technical innovations (less water use for flushing toilets, less use in washing machines).

Critical water use (for drinking and food preparation) is only 3 – 4 litres per day, or some 3% of total domestic water use. This combined with water for washing dishes and laundry would total to about 30 litres per day.

Most water in the Netherlands is used for personal hygiene (bath, shower): about 50 lcd. Whereas in Holland, almost all houses are equipped with a bathroom/shower with hot water supply, such a service level is seldom in most places in rural Armenia. This obviously leads to a lower average demand in rural Armenia. While anecdotal data from rural households – which have to boil water for bathing – suggests that typically 20-30 litres per day is quite enough for personal hygiene.

Based on this assumption one would conclude that (on average) 50-60 lcd would be a minimal amount of water, needed to meet the minimal needs of a human being (water for drinking, cooking, washing dishes, laundry and personal hygiene).

2.3.4 Distance

Following the WHO guidelines, a distance of near zero would be preferable. MDG targets refer to maximally 1 km. It can be argued that access to a public tap within 100 meter also can be considered to be a reasonable solution[8].

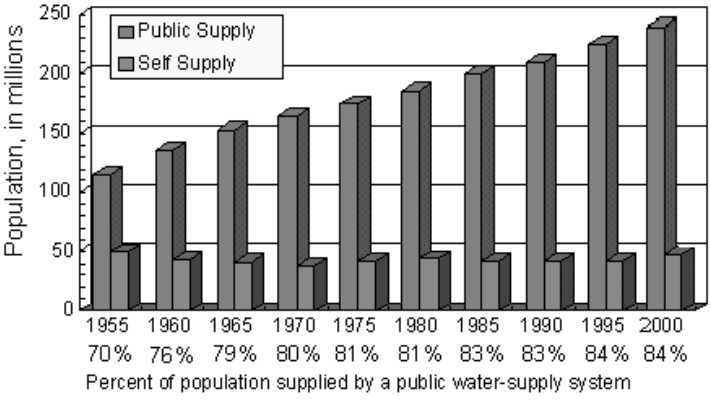
For at least 5% of rural population living in the fringe area[9].such public supply near the home, will not be possible at reasonable costs. As the census reveals in such cases water is taken in from streams/rivers, wells or individual tanks.

In practice, this implies that the rural population, which cannot be served by a central system (estimated to be at least 5%) should have another form of minimal water supply, concerning the distance. Options would be:

- own "protected" source[10];
- bring in water with water trucks, although the UN classifies this as "non improved". It may well be an improvement, if the water that is brought to remote places is of good quality (checked by a water company) and is sold at reasonable costs (this may well be below the actual costs to bring the water to remote places, this would imply that subsidies are needed to connect this part of the population.

That this is not uncommon, even in one of the most developed countries in the world is shown by the following figure.

Figure 2.5
Public supplied and self supplied populations in the United States, 1955 - 2000



Source: USGS

It shows, that in the United States, about 15% of population still is "self supplied".

The conclusion for distance would be the following:

Each rural inhabitant should have access to safe water (from at least a standpipe) in a distance not longer than 100 meters from the house.

[8] SNiP effective in EECCA countries requires that standpost should be no father than 100 meters from dwellings. Also, the draft law on drinking water states (in article 17.3.a) "ensuring of provision of running water of defined quality to all residents within the territory of the community (with maximum 100 meter radius) through the available municipal water supply system".

[9] outside the core and outside of the (potential) service area of public water supply.

[10] One of the most important issues about the protection of a water source is to prevent storage and spilling of pollutants in the vicinity of the source, or to have animal entering into the "protection zone" of the source.

If it is technically or economically not possible to construct a branch of the public water system near the house, public authorities should allow "own supply" ("protected water source"), but regularly check water quality and advice users on best practices (at no or little costs to the user) or should bring in water to remote consumers by a water truck (again, at reasonable price to the consumer), possibly also help construct individual water tanks to bridge days without supply.

2.3.5 Water quality

Ensuring drinking water quality in most cases requires the intervention of professionals. Assessing quality is already a professional job (using testing equipment in laboratories), producing high quality drinking water (with no risk to connected clients) involves some form of treatment (in many cases chlorination) and high skilled labour to operate equipment.

So ensuring water quality requires an institutional set up and equipment, with sufficient access for rural water producers (the water companies, but also individual villages or even individual houses) to highly qualified workers.

At present, these pre-requisites are generally not in place in rural areas. How this should be organised, especially for settlements without water companies and for individuals that have their own water source, is at this moment not clear. A solution can be to establish professional water companies throughout the country, as these companies could ensure water quality, professional treatment, etc.

In case no water companies will be established, an option for the rural settlements without water company services can be to set up inter-municipal water bodies, which could perform certain task of water suppliers (quality checks, planning, etc.).

2.3.6 Water service quality

Apart from quantity, distance and (biochemical) quality of drinking water supply, the water service in rural areas also should be regular.

In the Poverty Reduction Strategy Paper, a 24 hours per day service is targeted for rural water supply by 2012. This will hardly be feasible, as in the current situation regularity of water service in rural areas, is one of the most mentioned problems[11]. A more practical approach may be to assume at least 8 hours water supply per day (which is also proposed by comments of KfW).

For the households not connected to piped water, the situation may be varying. On the one hand, households with their own water source my have regular supply throughout the year. On the other hand, for households without own supply (for example, when the water is brought in by water tankers) service may be irregular (e.g. once a week).

To a certain extend, regularity can be dealt with by buffering (storing) water (central or decentralised, at homes of the households). In cases of supply by a non piped system, individual storage facilities could be considered to be the responsibility of the public authorities (as to guarantee regularity).

2.3.7 How should MWSS be understood?

In the previous sections, proposals have been developed to materialise the MWSS concept. But still a few questions need to be answered before a final proposal can be developed:

[11] According to the results of the JICA questionnaire 56% of rural settlements declare that water supply is "not sufficient in a period of a year", another 22% declares that water supply is "not sufficient throughout the year".

- do MWSS apply to the whole country (so should be applied in each and every settlement) or are MWSS to be specified for each settlement (as may be read from chapter 4, article 17.4 and 17.5 of the draft law on drinking water)?
- by which date the MWSS should be implemented in all settlements in (rural) Armenia?
- should the MWSS regulate mainstream of water supply or should it rather regulate the exemptions?[12]

As it stands now, MWSS will be location specific (although also the "authorized State bodies on water systems management and health, within the scope of their responsibilities", would have a say according to the draft law).

This would be an inefficient solution[13], and would leave much uncertainty for the consumers. It is therefore advised to make a uniform MWSS applicable to the whole territory of Armenia.

A clear time table for the implementation or the achievement of the MWSS should be set, comparable with the time table for the implementation of the rural water supply targets in the Poverty Reduction Strategy Paper.

Also the question whether the MWSS should regulate the mainstream of drinking water supply or should just regulate the exemptions, needs an answer.

In most developed countries, water utilities are obliged to deliver water to whomever asks for it, in quantities demanded by consumers (assuming that the consumer is willing and able to pay). In practice this means that water companies or utilities have to build and maintain facilities that can meet the demands of their customers (which is logical in a market economy). In cases this is not possible (e.g. too high costs to supply water to remote customers: the "exemptions"), procedures regulate such exemptions.

In Armenia, rural water supply is often already above the proposed minimal quantities (of 50-60 lcd), and on plot. This implies that MWSS for these consumers should not be the future target, as this would decrease their current service level.

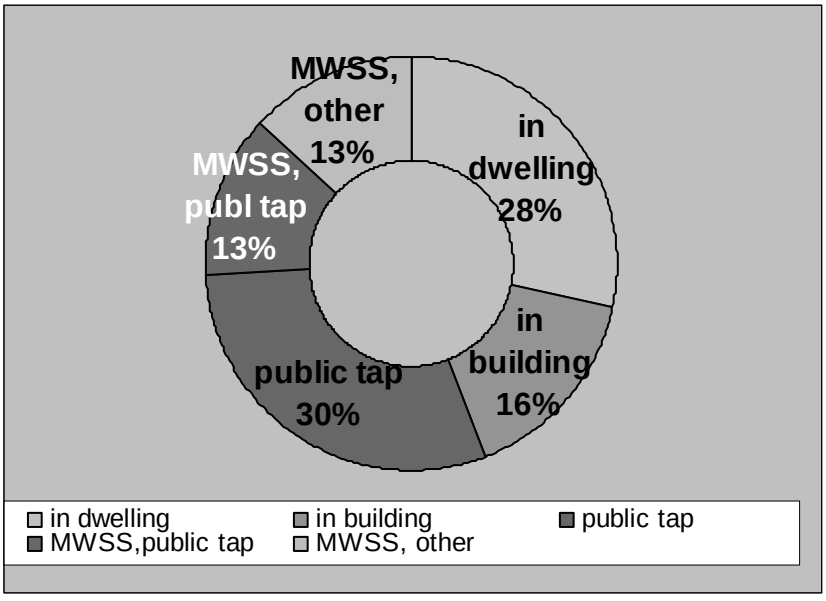


Figure 2.6
Indication of rural water supply in Armenia, according to MWSS, 2015, by type of connection

[12] According to the comments of the kWf, the MWSS should rather regulate exemptions than the mainstream, ensuring availability of the minimal water supply to those who does not have it at present.

[13] For each community with own central water supply, discussions and decisions can be foreseen, taking a lot of time and money, but probably resulting in more or less the same standards. Moreover, if at the central (or even world) level, decisions already have been made on what is desirable or not, sustained by professional evidence, how can such information be challenged by less specialised/qualified persons in rural areas of Armenia?

This would obviously limit the targeted rural population to be supplied with MWSS, to the group of inhabitants (and settlements) where the above outlined MWSS are currently not met.

Figure 2.6 gives a possible way of how MWSS could be implemented for rural water supply. Assuming that for the groups "In dwelling", "in building" and "public tap" the requirements of MWSS are already met, MWSS would mainly address the rural population and settlements without access to central drinking water supply, partly by extending the central supply, partly by ensuring that individual water sources are "protected".

Taking into consideration the foregoing analysis, the following definition of a unified MWSS is proposed for consideration by the SC:

- all rural inhabitants should have regular access to quality drinking water via centralised water supply systems, or from individual sources (protected wells, springs, boreholes and surface water or water tankers);
- the minimal amount of water should be 50 lcd;
- the distance between the water supply system and the consumer's dwelling should not exceed 100 meters
- The MWSS should be achieved by 2015

2.4 Comparing MDGs for Water Supply with MWSS

In the previous sections, operational definitions of the MDGs and MWSS have been developed. These definitions are based on the information that currently is available, using the guidance from WHO, international experience on the one hand and specific information available for Armenia.

When comparing the MDGs for WS in Armenia (the official definition and the interpretation suggested in the PRSP), with the MWSS, the following can be said:

- In comparison with the official definition of MDGs for rural WS for Armenia, the MWSS would be more ambitious in every sense (as can be seen from comparing figure 2.6 with figure 2.2);
- When compared to the MDGs for rural water supply as defined in the PRSP, then on the one hand, MWSS are more demanding than the MDGs for WS, as the MWSS assume the 100% of rural population should be supplied with water (of which a part with minimal quantities and distances);
- On the other hand the MWSS are less demanding, as the MDGs as defined in the PRSP would require that the on plot water supply should be increased by 25%, whereas this would not be regulated by the MWSS.

It seems reasonable to reject "the official MDG definition" approach (discussed in section 2.2.2), as this approach is already overruled by the PRSP.

2.4.1 Developing a Policy Package for rural WS in Armenia

On basis of the considerations discussed, a policy package can be developed for rural WS. The following table gives an overview of the possibilities.

Table 2.4
Possible Policy Packages that can be simulated on rural WSS

Policy Package	Description
MDGs for rural WS as defined in the PRSP	Increase – by 2015 – on plot WS to 70% of the rural population
MWSS	Regularly supply – by 2015 – of currently not publicly supplied rural consumers and settlements (about 25%) with at least 50 lcd and at a maximal

Policy Package	Description
	distance of 100 meter
Combined MDGs (PRSP definition) with MWSS	Increase – by 2015 – on plot WS to 70% of the rural population àndregularly supply – by 2015 – of currently non publicly supplied rural consumers and settlements (about 25%) with at least 50 lcd and at a maximal distance of 100 meter

2.4.2 Practical implications of a combined MDG's and MWSS strategy

The practical implications of a combined policy package to achieve both MDG's and MWSS can be as follows:

- to assure meeting the MWSS, households with no public supply (estimated at about 25%) should get near (within 100 meter) access to water. This can be achieved in various manners:
- establishing stand-posts nearby (within 100 meter);
    - shift individual water sources from "unprotected" to "protected"[14];
    - individual water reservoirs to be supplied by publicly controlled and financed tanker trucks;
    - connection to piped water in house or by yard tap;
- to assure meeting the objectives on WSS set in the PRSP, households currently supplied by stand-posts (about 25% to 30%, see figure 2), should be connected to a piped water distribution system (in house or yard tap). Also other options can be envisaged:
    - only partially replace stand-posts by on plot supply, and target the population which currently has no access to public supply.

In the "extreme" situation, the MWSS and PRSP don't coincide:

- PRSP may target the already publicly served population (replacing standposts by on plot supply);
- MWSS target (mainly) the population without public water supply (assuming that the publicly served rural population has access to at least 50 lcd)[15]

Assessing the current situation, in view of the proposed MWSS, is outside the scope of the current project, as it would require a very detailed data collection activity[16].

But if a MWSS is adopted, it would be expedient to adjust PRSP accordingly.

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[14] In practice this may often mean that the current situation is legalised and surveyed/monitored by public (water) authorities.

[15] This does not have to be the case, but statistics indicate that the average rural water supply in rural Armenia was 43 lcd (Armstat, 2006, table 136). As this figure includes also the non served population, it can be assumed that water supply to those who have public assess (about 70% of rural population) will be higher than the overall average.

[16] This is also recognised by the experts of KfW, in a letter to the SCWS in which the initial steps in this project are addressed: "For making justified decisions regarding quantitative and qualitative indicators (i.e. quantity, technology, regularity, quality, etc.), as well as before assigning any authority with the responsibility for enforcement, the Government of Armenia will need a comprehensive study. The study should cover all settlements and consider inter alia availability of water sources and possibility to deliver water at reasonable costs (particularly taking into account affordability issue). However, for the purpose of the FS for Rural WSS, supply of piped water (approx. 50 lcd, 8 hours per day from stand-pipes located within 100 meters from dwelling), which is appropriately treated in order to ensure safety for the health (according to the national standard) could be defined as a "minimum water supply standard""

2.5 Rural Sanitation

The Poverty Reduction Strategy Paper, nor the Note on MWSS do mention water sanitation as a priority. The current situation is however far from optimal.

As the water supply system will develop, more rural households will install bathing facilities and flushing toilets. This will increase the production of wastewater and thus the need for more advanced sanitation solutions (septic tanks and simple sewage systems).

Some improvement (for example from (simple) pit latrines – currently estimated at 60% – to simple septic tanks) can be imagined. This might imply a targeted reduction of simple pit latrines to 30%, while the rest should have improved pit latrines, septic tanks and simple sewer systems.

The following approach is proposed to the SC on sanitation

- reduce simple pit latrines owned by households to about 30% of rural population by 2015
- increase improved pit latrines and septic tanks to about 70% of rural population by 2015 (in connection with the type of water supply: if on plot water supply with some 80+ lcd exists then at least a septic tank should be installed)

3 POLICY SCENARIOS BASED ON MILLENNIUM DEVELOPMENT GOALS AND MINIMAL WATER SUPPLY STANDARDS

3.1 Introduction

A policy scenario can be build on an Armenian-specific interpretation of:

- the Millennium Development Goals for the rural WSS, and,
- the Minimal Water Supply Standards.

These have been discussed in the previous chapter. But also other important considerations, like the findings of the baseline scenario, should be taken on board when developing a Policy Scenario and a Financing Strategy.

In this chapter first attention will be given to setting "SMART" targets, next the structure of policy scenarios will be discussed, and a general proposal will be presented for further development of scenarios that can be simulated.

3.2 SMART targets for a Financing Strategy

The main challenges when developing a Financing Strategy for rural Water Supply and Sanitation are:

- Set "SMART" targets for WSS infrastructure rehabilitation and/or development, and design realistic (feasible) scenario(s) to achieve the targets
- Achieving a structural sectoral policy dialogue on priorities, targets, development scenarios and Action plans at national and/or regional and local level.

"SMART" targets[17] relate to the development and operation and maintenance of the WSS service infrastructure. Such targets should be:

- **Specific**. This means that a general target (for example: 50% closure of "the gap in safe water supply") needs to be specified for different situations. For rural WSS services this can mean that at least certain quality and quantitative standards are met for certain target groups (for example currently not served by WSS infrastructure);
- **Measurable**. This means that the targets of a strategy can be quantified and measured;
- **Achievable**: This means that consensus needs to be built for targets to be achieved;
- **Realistic**. Target must be set realistically. This may relate to the availability of sufficient financial resources, but may also mean that one should not assume that targets can be met overnight (always a certain period is needed to develop and implement plans);
- **Time-bound**. Targets must be set time specific, so a target like "everyone in rural areas needs to have access to tapped drinking water" should at least be accompanied by a time framework in which this target should be achieved.

Target setting is an iterative process, as policy decisions influence the actual implementation of the strategy. It may take for example take a year or more to agree on which targets should be included in a strategy for water supply and sanitation. In the end, a national strategy should result in many thousands of actions and small or large decisions that have to be taken. Once agreed on the principles, details have to be discussed and should be made operational.

Implementing a strategy for WSS services in rural areas requires a well-structured dialogue on sectoral policy. As the implementation of such a strategy will take years, it needs continuous attention of the main stakeholders.

[17] In various sources in the internet a slight differentiation is apparent on what exactly "SMART" stands for. The current definition is the most common used: Specific, Measurable, Achievable, Realistic, Time-bound.

At national level one should be informed on the pace of implementation (and possible draw back, delays and lack of funds), making it possible to monitor progress and if needed making changes. Also efforts to generate sufficient financial resources can be a national task. On regional or rural level, activities should be undertaken to implement the strategy and report on it, seek solutions, etc. The dialogue should be focussed on the whole planning cycle, progress, social-economic aspects and how to solve these, set up of efficient institutions that can cope with more advanced water related policies forthcoming (Integrated approaches).

Common elements of a Financing Strategy for rural water Supply and Sanitation, are:

- **use of computation tools**: this enables a structured estimation of investments, operational costs and the timing thereof, and the way how a strategy is financed (by user charges, budget contributions, (international) loans);
- **gap analysis**: this may addresses several issues: legal, institutional, infrastructural and last but not least also financial. The financial gaps relate to “cash flow gap”, “household affordability” and “budget and economic affordability”;
- **iterative planning process**: apart from solving legal and institutional gaps, a Financing Strategy basically solves the tension between infrastructural needs (development of a WSS infrastructure) and financial-social-economic constraints;
- **complementary policies**: at least a minimum level of water supply and sanitary standards should apply to the largest possible majority of rural population. This implies that households that have little or no ability to pay for WSS services, should be supported.

3.3 Baseline scenario findings and resulting actions

From the baseline assessment (see TME, 2007a) the following – interlinked – conclusions can be drawn concerning the rural Water Supply and Sanitation:

- institutional set up needs further development;
- the WSS infrastructure needs to be better maintained and developed;
- a lack of revenues for financing the needed actions.

3.4 Development of Policy scenarios

In the previous chapter, the basic elements of a policy scenario have been discussed and delineated. Further specification is necessary, as explained in the section on SMART targets.

An important finding of the baseline is that currently, about 140 rural settlements do not have a central public water system. Moreover, in most of the rural settlements part of the population is also not served with piped water (via in-house tap, yard tap or standposts).

The following table gives an overview of this.

Table 3.1
Rural population in Armenia, estimated status of water supply, total, and not served

Marz or Institution	No centralised supply	Standpost	Yard tap	In house	TOTAL
Aragatsotn	10600	24600	10100	10600	56000
Ararat	14400	14400	21300	25800	76000
Armavir	19400	18800	11300	13100	62600
Gegharkunik	21500	27300	7200	15100	71000
Kotayq	18500	23700	4000	11600	57800
Lori	9700	11400	8000	27400	56500
Shirak	13600	16800	4300	20100	54800
Syunik	5400	3100	4500	7600	20700
Tavushi	17600	14500	6200	13500	51800
Vayotz Dzori	3100	3900	3900	4000	15000
AWSC	79000		107400	208500	394800
Nor Akunq	5400		400	11700	17400
Lori WSC	4400		7200	4700	16300
No distribution	49900				49900
TOTAL	272500	158500	195800	373700	1000500

Source: assessment TME

The table shows that, apart from the settlements with no central water supply, in other rural settlements about 225,000 inhabitants also do not have access to central water supply.

According to the MWSS, all these rural inhabitants should be connected to some form of (basic) water supply (stand-post), or with "protected" individual water sources. In combination with the MDG's for rural water supply, for part of the rural inhabitants classified under "No centralised supply" and "Stand-post" the level of water supply should be upgraded to "(very) low" public health risk (applying the standards of the WHO).

According to the above table, about 57% of rural population is served by "Yard taps" or "In house taps", the MDGs for rural WS, as laid down in PRSP, specify that this should be increased to 70% by 2015. This would imply that about 156 000 rural inhabitants (currently in the group classified as "No centralised supply" and "Stand-posts") should have access to piped water on plot**.** So either, almost all stand-posts should be replaced by "In house" or "Yard" supply, or part of the group with "No centralised water supply" should be upgraded to "Yard taps" or "In house taps".

Implementation of MWSS would imply that (mostly) the rural population without public/central water supply should have access to (at least) standpipes or "protected" water sources (at no more distance tan 100 meter from the dwelling).

To assess a feasible development scenario, we propose to the SC to simulate the following scenarios:

- **scenario 1**: upgrading the group "No centralised supply" to stand-posts/"protected water sources" (with a supply of 50 lcd), in combination with upgrading the group "Stand-posts" to (partly) "Yard taps" or "In house taps";
- **scenario 2**: upgrading the group "No centralised supply" to (partly) stand-posts and partly "Yard taps", and partly upgrading the group "Stand-posts" to "Yard taps" or "In house taps".

Scenario 1 can be classified as a "least cost" approach of combining the present PRSP and MWSS, whereas Scenario 2 can be classified as a somewhat more advanced approach (as also part of the currently not publicly served population would have on plot supply).

Moreover the following is proposed to the SC, to take into consideration with the simulations

For the rural population to be served with on plot supply, we propose to simulate a system which can (at least) deliver 100 lcd, as to anticipate the future demand of rural population, and also avoid high future investments to upgrade supply systems based on lower supply than 100 lcd. This scenario would also imply more expensive sanitation, as with water consumption exceeding 80 lcd pit latrines are not sufficient: a septic tank or a simple sewer system should rather be envisaged.

3.5 Legal issues

Although this project does not aim at providing detailed input on legal issues, the following recommendations can be made:

- In the "Law on Drinking Water", deadlines should be set for the main issues like:
  - when water companies have to be established;
  - when minimal water supply standards have to be applicable and enforced;
- The Law should clearly state, that water companies have the legal obligation to provide water (on the basis of contracts) to all consumers within their service area that have such a demand (except maybe industries, as their demand for water might exceed available capacity of the water utility), rather than regulating that contracts may be established between the water supplier and the customer (as is referred to in many articles of the current draft law);
- It would be good if municipalities and/or water suppliers would have the obligation to establish water supply and sanitation plans within a certain timeframe (for example within 4 years). Such plans can include a systematic description of the situation in the base year, proposals for how to achieve MWSS investments, further development of the water infrastructure etc;
- The Law should also require reporting on the status and performance of WSS systems by all municipalities (according to a simple report format to be introduced).

3.6 Institutional issues

As the baseline assessment shows, the institutional situation concerning water supply in Armenia is far from ideal:

- about 1/3 of rural settlements is served by water companies (that also include urban supply and sanitation);
- about 2/3 of rural settlements is not served by water companies, but in most of these settlements some form of piped/central water supply is available. These systems are managed by the local authorities;
- in over 100 settlements (with an estimated population of 50,000), no centralised water supply system is available.

In the draft law on drinking water, some provisions are made on the institutional set up for (also rural) water supply. These provisions mainly refer to legalise the current situation[18].

A main draw back of the current situation on rural water supply in Armenia, is that for many settlements, the service area is limited to the settlement itself. In absence of national subsidies, such settlements will face difficulties to finance water supply, especially in cases water supply is relatively expensive (for example much more expensive than the (national or regional) average costs of water supply.

[18] Article 9. Subjects of Relations in Drinking Water Supply and/or Wastewater Collection Sectors

Cross subsidisation
Cross subsidisation is a basic principle that is applied in many sorts of public services. For water supply it means that more expensive connections (remote) do not pay the full costs of water supply, whereas the "cheaper" connections pay a somewhat higher price than the actual costs of supplying water.
Cross subsidisation makes it possible to provide a higher service level to the whole population, than in absence of cross subsidies.
The larger the service area of a water utility, the more inhabitants can profit from cross subsidisation. So if a water utility supplies both urban and rural settlements, it has a much better possibility of cross subsidising rural connections, than a water utility that only supplies a (small) rural settlement.

Cross subsidisation will not be automatically be established, as in general the settlements with lower costs will not be eager to subsidise settlements with higher costs (due to rather egoistic principles).

To establish a cross subsidisation principle, therefore may require active interference of a regulator (or the state), forcing water utilities to merge into larger entities, and introduce unified tariffs within their service areas, or within specific regions if agreed by the regulator, and charge customers accordingly.

In the current situation, only the water companies, that cover both rural and urban settlements, have a good opportunity to cross subsidise. Settlements that operate their own water supply system, have only a very limited option to cross subsidise (the "expensive" connections can still subsidise the "very expensive" connections).

So basically, in about 2/3 of the rural settlements in Armenia, the possibilities to make use of the cross subsidisation principle are (very) limited. This will make it very hard or impossible for these settlements to expand, operate and maintain water supply infrastructure.

Another serious draw back of small rural water utilities, is that they will not be able to hire the needed professional expertise (technical, financial, legal, operational), which will eventually result in technical, financial or legal problems,

Although a simulation of a FS on rural WSS with Feasible does not require a decision on how the water sector is organised[19], it is evident, that the institutional set up will affect the feasibility of any proposed scenario for the development of the water sector in rural areas of Armenia.

We propose the SC to make the following simulations to make choices to be made by the Republic of Armenia more transparent:

- calculate, per group of similar settlements, the costs of water supply per inhabitant (average value of the water bill)
- analyse the cost differences between groups of similar settlements
- assess and compare average costs of water supply for rural settlements for (a) present institutional set-up and (b) for a set-up which anticipates delineation of Armenia into few service areas with appropriate unified tariffs within each area - to assess how much the existing affordability constraints could be soften for the settlements with highest unit costs of water supply (specific delineation will be advised by, and/or agreed with the SC)

[19] Feasible, ruralWSS module does not allow for entering user charges per (group) settlement, so it only can be used to generate a regional or national assessment.

3.7 Data and information for decision-making

In the coming years the government of Armenia should take the necessary steps to ensure that the information that is useful and needed to plan and implement the strategy and plans will be available for the institutions dealing with (rural) water supply.

In this respect it will be good to set up a structural way of exchanging information between rural communities and the central government (SCWS). This can be done through the statistical services, but also the SCWS should have access to these essential data.

During the implementation of the project, it appeared that the SCWS has little to no access to quantitative information on rural settlements. not the capacity to analyse results of investigations, etc. This however, should be a priority of the SCWS as a good policy, strategy and plans can only be based on access to all relevant data.

This is even more true for the implementation of the strategy in the coming years. The proposed “water supply and sanitation plans” could be a valuable source for such information. A special report format for municipalities could also be developed and introduced.

SOURCES OF INFORMATION

Armstat, 2000, "Census", Armenia Statistics, Yerevan, 2000.

Armstat, 2006, "Statistical yearbook, 2005", Yerevan, 2006.

FAO, 2007, "Water use per capita per day in China", http://www.fao.org/AG/agl/swlwpnr/reports/y_ea/z_cn/en/maps_e/e037.htm

Fundação Oswaldo Cruz, 2007, "Domestic water use in a rural village in Minas Gerais, Brazil, with an emphasis on spatial patterns, sharing of water, and factors in water use", Escola Nacional de Saúde Pública.

Government of Armenia, 2004, "Poverty Reduction Strategy Paper".

KfW, 2007, "National Policy Dialogue project, Steering Committee (SC) meeting, Yerevan, 22 March 2007, Comments and proposals regarding documents presented to the SC members", Yerevan, 20 April 2007.

MNP, 2005, "Milieu & Natuurcompendium, Milieu en natuur in cijfers, 2005" (Environmental and Nature compendium, Environment and Nature in figures, 2005), published by the Milieu en Natuur Planbureau (Environment and Nature Planning bureau, the Netherlands), Bilthoven (http://www.mnp.nl/mnc/i-nl-0037.html).

Natural Resources Canada (NRCan), 2007, "The Atlas of Canada, Domestic Water Consumption, 1999", Ottawa, Ontario.

OECD EAP Task Force, 2005, "Rural cost functions for water supply and sanitation", (EXD/PCM/EN/NMC/04/125), Technology Overview and Cost Functions, November 2005, prepared by COWI AS.

OECD, 2005, "The FEASIBLE Model, Rural cost functions", User Manual, prepared by COWI, June 2005.

RA, 2007, "draft Law On Drinking Water, Republic of Armenia", (unauthorised) English translation, March 2007.

SCWS, 2006, "PROPOSAL, about tasks and measures for provision rural communities with minimal water supply service", communication of the State Committee for Water Systems in Armenia, provided to TME in November 2006.

TME, 2007a, "Financing strategies on rural Water Supply and Sanitation in Armenia, Baseline simulation", Yerevan/Nootdorp, March 2007.

WHO, 2006, "Guidelines for drinking water supply", first addendum to the third edition, Volume 1: Recommendations, World Health Organization, Geneva.

UN, 2000, "Resolution adopted by the General Assembly [without reference to a Main Committee (A/55/L.2)] 55/2. United Nations Millennium Declaration, The General Assembly, 8 September 2000.

UN, 2007, "official Millennium Development Goals website", (www.un.org/millenniumgoals/)

U.S. Geological Survey (USGS), "Selfextraction", (http://ga.water.usgs.gov/edu/wudo.html)